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EXHIBIT 427

Price Discovery on the NYSE and the NASDAQ: The Case of Overnight and Daytime News Releases

Jason T. Greene and Susaii G. Watts

From F. C. in its an Antaran Professor of Finance in corona Start Conserving, a conta. GA Novem G. Watts is on Associant Professor of Accounting at Indiana Conserva. Bloomingson, IN

We exact the banker recover to quantitate enough material and a material made during rading and a satisfaction boar on the NASE and the NASE (1). For non-rading during amount contents, the opening made on the NASE impounds must of the price response where as for inding-hours aminoncements, the response is specificably used the first several invaluations and indies. In contain, the first pass-amino-coverent made in the NASE (2) impounds must of the price response regardless of aminonic mean time. These results suggest that the different material invaluations in the radio exchanges to all opening versus distance transfer call oncover versus continuous mathrip, etc. I may differ a their addity to impound information.

■ The purpose of this paper is a examine the mock market response to compage unconcents made to during the tradius day and 2 picture, the unsitutionally ampowed overtright period of no wading on the New York Stock Exchange (SYSE) and the National Association of Securities Laulers Automated Quotation system (NASDAQ) On each exclininge, there are two reasons to expect that the response to news released during trading hours differs from the response to news released during nontrading hours little if it was is released during the justifutionally imposed overnight period of no usuling, there is additional time for broad dissemination of the news as well as tune for my saws to subtine new orders or change existing orders. Thus, the first post-announcement price may be usure informative for nontrading-hours immunicoments. Second both the NYSE's and the NASUAQ's opening procesiones differ from unding procedures employed during the rest at the trading day. In particular, the NYSE

auction oechanism thereats. If these mechanisms differ in their abitive to impost a financiaron uno price, then we may observe differ in price adjustments following news amnouncements made during nontrading and tradity hours. On the NASDAQ, a quare discover, the opening trade is proceeded by a period of informal price discovery by dealers. If pre-opening informal price discovery contributes to a more informative opening price, we may observe a different price adjustment to news announcements made during nontrading hours.

In order to evaluate the effect or announcement time and market microston-ture on price discovery, we examine the market response to quarterly earning anaponeous made by 100 NYSF firms and 100 NASDAQ firms during the 1990-1991 time period. We find that on a transaction-by-transaction basis, immediate post-announcement price discovery differs for trading, and nontrading hours announcements on the NYSE but not on the NASDAQ. In particular, on both exchanges, the majority of the price response

ster a and there is thank then enculyined, reference for a soments and organization ground appears this paper. We are also give full for the enaments and to be of Mark tragged and the bosons Law Collins Doug textury beath transaction. Bruce tolurism, Ferrors Nelson, and Mark Remainment in the useful community in an original version of the paper We think 1978.5, the, for marking carriers region of the paper We think 1978.5, the for marking carriers, tourses date to making the paper we find the total through the control of the System. I need data law, been provinced to part if the transaction program to reaccurage carriers expectation from the transaction of the transaction of the full carriers of a facility and only the finite order. Mark the thin could account a facility of the line orders. Mark the finite orders the finite orders of the finite orders.

The NY I's call market open connectors a building of many orders that the event dation. Trackets learning price in a continuous methor issues are one upon supported in a postunially sufficient prices.

The NASTRAL is a descent about a manner from a system of hid and solved prices submitted by comment dealers

to nominaline from carriers announcements or realized during the opening toxic, However, on the NYSE, the price adic bacot to trading seems coming contour concurs is spread comby even the fast several post-tomouncement trades, whereas on the NASDAQ, the price admission to trading-hours enumes appoundements is concentrated in the first post-unreament trade with only relatively wight adjusticent in the next second transactions. Thus, hansaction time male or indicates some billeron, or in procedits overhowever, when lesk time is considered, price adjaces rapidly over the first past at nouncement half hour for back types of annous ments on both exchanges. Thus, the significant differences in prace discovery we concentrated in the transactions immediately allowing the release. Consiscont with prior research, we find that prost announcement tradition volume is abnormally high and mays elevated into the next reading day regardless of tomograment time conversation.

Our research contributes to the scentch market microstricture harmage in two ways. First, the speed and accuracy of price determination in capad markets is important to individual and institutional investors affice, since poorly fined or mispriced (other can reduce realized mains, Furthermore, as Schwartz and Shapero (1990) none "so a market participants (day traders in particular) may profit from mispricing and the excessive short-ran volatility at creases," This research provides empirical vidence on the extent and duration of possible mispricing around carning amounterments made at different times of the day.

Second, as trading becomes more global (e.g., some stock exchanges are changing their microstructure in adopt to additional volume, and new exchanges are energing) and as the major U.S. stock exchanges move toward around-the-clock trading, it is important to understand how different auction mechanisms and the dealer or specialist systems themselves may affect the price adjustment to major news releases.

The rest of the paper is organized as follows in Section I, we describe the information disclosure environment for publicly traded firms and develop resuble hypotheses. In Section II, we discuss the data and present the results of the empirical tests. In Section III, we offer concluding remarks

I. Development of Hypotheses

The Securities and Exchange Commission requires "full and fair disclosure for all material facts concerning security of publicly traded companies. Some companies meet this requirement by disclosing material facts to financial newswire services (e.g., Now Jones & Co., better known at the Broadtape), other newswire services (e.g., Associated Press).

not now spapers. Market sensitive (manufal to condition is geterally broadcast over financial to covines within minutes of management's communication; that, the breakcast to piculty represents the first confile," announcement of the new 1

The Broadings runs from 8:00 a.m. until approximately 6, 30 p.m. EST. However, the NYSE and the NASDAQ are open our trading between 9:30 a.m. until 300 p.m. EST. Thus, afore attacking to be released while these markets are closed if it is transmitted to be a longs between 8:00 a.m. and 6:30 p.m. or between 4:10 p.m. and 6:30 p.m.

handled in the introduction, the early several reasons. to expect differences in the price decovery process to news announced during trading and nonunding hours. First, announcement time may affect the degree to which the interrecess is dissentingled becauthe first positionnouncement track, More specifically, if news a released furing nontrading hours rather than during the trading day itself, the news is more fikely to be fully becommuted before tracking begins condingly investors in well as the NYSE specialists or the NASDA() dealers, will have had more time to consider the pricing implications of the new 5 Second, if news is amounced during nominating hours, investors are likely to have more time to submit the orders of change existing griders after considering the new information.6 Third, the oxning procedure on both exchanges differs from the procedures employed for the rest of the hading day.

Specifically, on me NYSI a call (i.e., basch) miction opens trading. During this opening procedure, NYSE specialists (the sole market makers in the speck) determine corporing price by bulencing the buy and sell orders submitted assembly. If news is a monneyed during trading hours, on the

Examings, this ideal consumerations, merger inequisitions, tender sillers, sont opins, management changes, and substance does of non-recovering account of contract mean arean mediately declared by publicly maked time.

*See Fra: (Pagach, and Stephas) 921 for a discussion of Broadings reporting procedures.

In fact, the American Stock Exchange, in the company manual, encourages the reviews information offer the markets are closed so that the news will be more widely descending of before ending begins the next day.

The news is released during the trading day on the other hand, traders with particularly easy access to the trading observation, an unstitudent interpretation that the major of the news, while other inverses one exceeding and forming trading strategies free travers, that interpretation the news and forming trading strategies free travers. This may inhabit suped to provide the process and the sign allow since to reflect their attentions.

These enters come the or three some sections, the crowd of traders cound the eyested SuperDOI. Specialists may obtain additional orders and more arise clearing processarium collect matter must') to brokers in the crowd before settling an excepting price. Otten approhibite must buy or will not, "map on" I term their own mentaling thin procedure. Typically, the names of shares changing hands in the lists.

of archand, ever first pear a contractment pression the NYSE is determined by the continuous matem mechanism in place throughout the rest of the trader day. Thus, on the NYST, the first post impotencement took following a nontrading-hours amount out in represents a beaching and execution of many orders whereas it. This performancement trade following a spalling-hours announcement represents the execution of saly one asset. After the open, specialists are charged with mentaining "ten and orderly" in the teles. manuatining a succeeds standard of price and as order, these price changes become successive reides; while componer while them trackes and brid orders. Because call and exactinated tracting mechanisms can drifter in their ability to impound information in price and because specialists are required to maintancprice continuity during the trading day. It is possible that the more discovery process will differ for undings and nontroducthours autourcements on the NYSE?

moore-isiven, dealer market On the SDAO. mechanism is emproved for all transactions during the making day, with deciers have the minimal obligations 10 Thus, on the NASDAD, all takks represent the execution of one order, and none represent a batching and execution of many orders during one transaction, the coor, even they is there is no formal cult market opening on the NASD 503, the open of rade to preceded by informal price discovery. Specifically, during the pre-opening hours, NASDAQ dealers familiarize themselves well relevant news stories breaking overnight and attend to ach and trading accuracy. Doring the (approximately) and half hour before the opening of trading. they also per thought in quotes that is, quotes that they do not have or hown) If This pre-opening activity may affect the informativeness of the transpost-amount conent trade's price. Despite this, since both the NYSE's and the NASDAQ's opens are preceded by an overnight period of no trading, an unalysis of price discovery after nontrading-hours amountement on both exchanges can yield insight anothe relative effectiveness of the opening procedures in producing mformative práces.

transaction of the frading day significantly particle fine of the relative terms.

The parvious discussion of each that ice mise of differences in the technical aspects of trade, or certain does at the case price discussory may differ depending on whose of the news is unmounced during trading hours or nontrading hours, regardless of the exchange. It is also clear, however, but if amount emean time is held constant, price discovery to a depend on the exchange. These considerances fond to the following time of hypotheses.

- Mai. There is a line care in the price discovery process following training and nontrodine-hours now amount amount on the NYSE.
- H₀₂. There is no difference in the price discovery process following rading and nontrading hours new authorneous on the NASDAQ.
- Hore is no difference in the price discovery process following neutraling-hours two samouncements on the NYSE and the NASE (1).
- Has: There is no difference under price and overview process following trading doors news annuancements on the NYSE and the NASDAY.

II. Empirical Tests

In this section, we test these hypotheses by examining the market response to quarterly earnings a mouncements made by a sample of NYSE and NASDAQ firms

A. Sample and Data

The sample is comprised of quarterly carriers announcements for 100 NYSE and 100 NASDAQ for us over the 1990-1993 cone period, ¹² We obtained quarterly carrings to ceases and actual earnings per share for all sample tirms over the relevant time period from) years Jones & Ryan's Institutional Brokers Estimate System (#B/L/S) identifuges, and we obtained price, volume, and time-of-trade data from the Institute for the Study of Securities Markets (ISSM) database (years 1990-1992) and from the NYSE's Trade and Quote (1/3Q) database (years 1993) and 1994). Means, medians, and standard deviations of selected descriptive variables for the sample firms are presented to Table 1. As the table indicates, both NYSE and NASDAQ firms are fairly large and actively traded. However, as expected NASDAQ

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It is also presente that a is tearnt once employed in training hears in our authorized could arise because the foliates areasisty our incertainty to submittee of the deal "which the out if "the find earlier to be majorized as the could be the majorized the majorized training to the find and the majorized training to the find and the majorized training to the find and the majorized training to the find the find and the majorized training the second training to the find that the majorized training the second training the second training the second training training the second training trainin

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[&]quot;The posting of annothing quases by NASO 100 deak or is anadopous to the "Kalling and at advantors for NYSE special":

Figs. 181 NAME and the 100 KASDAO dirus were made of selected on all NASDAO dirus whose maked at lend 50 may you day, on ascrape, were the 1994-100 time period. We used this minimum transaction frequency colorism to hopersome that firms in our simple were visible amounts to be followed by financial analysis and base dirict quarterly country analysis for followed by financial are followed as a financial acceptance with the following the financial area financial acceptance and country analysis and country and the following the financial area financial acceptance.

Table L. Means and Medians of Science d Variables for the Sample Firms

The snaly as is conducted over the 1990-1996 per at The NYSE sample consists of the times randomly drawn from those NYSE firms with an average of at least 10 manuscrious per day over the 1990-1994 period. The NASDAQ firms with an average of at least 10 manuscrious per day over the 1990-1991 period. Size is measured on the basis of market value of equity. Daily relative volume is calculated by dividing the number of shares traded during a partie of a day by the number of shares traded during a partie of a day by the number of shares constanding on that day. Medians are presented in particular.

Variable	NYSE	MASDAQ
Size (\$430)	5. 344.81 (3.382.001)	\$\$ 50.631 (394,492)
Shares Outstanding (000)	32.146 (55,702)	23.281 /19.2251
Daily Relaise Volume	11/313/22 11/313/22	(0.01213 (0.010%)
Transactions per Day	143	184 - (87)
Daily Trading Volume in Shares	349,110 (154,441)	340. V 73 (1 7 5,060)
Transactions Size in Shares	1,615	1.8 9 0
Dollar Volume per Transaction	\$\$1.442 -38.511)	940.337 (33.867)
Number of North American Lachunge Listings	B	A Committee of the Comm

firms are smaller, on average, than NYSE firms (e.g. average market value of equity of \$877 million versus \$3.5 billion for NASDAQ and NYSE linus, respectively). All volume measures are higher for NASDAQ firms (e.g., average duity volume of 340,973 shares and 249,110 shares for the NASDAQ and NYSE firms, respectively). ¹³

We searched the Dow Jones News/Retrieval text database to find the day, hour, and minute of the initial broadcast of the sample firms' quarterly carnings figures over the Broadcape during the 1990-1994 time period. An announcement found in the Dow Jones database was included in our sample if 1) associated analyst forecasts of that quarter's carnings per share were available on the IB/E/S detail tapes and 2) there was sufficient estimation and event period data available via the ISSM and/or TAQ tapes. This sample selection process yielded 1,307 NYSF quarterly carnings autouncements and 1,187 NASDAQ quarterly carnings autouncements. Of the NYSE autouncements, 5 made during trading hours were associated with trading hours. They were not included in our group of trading hours.

amouncements but rather overe analyzed separately as a group of trading hours an aconcements that were associated with rading halts. To determine whether the price adjointment observe I for the sample as a whole differs from that abserved when only particularly surprising announcements are considered, we calculated an associated analyst forecast error, based on the mean study a forecast in the Let month that ifB/E/S torecasted quarter I carnings for film is for each of our sample carnings announcements. Specifically, the analyst forecast errors (AFE_a) were calculated as follows.

$$AFF_{a} = \frac{AC_{1}UALFS_{a} - IBESFORECAST_{a}}{IBESFORECAST_{a}}$$

where

AFE	.	Analyst forecast error for firm in quarter (
ACTUALEPS _B = 7	.m.	Actual varongs per share for lum (in quarer)
IBESFORECAST _B	¥	Mean I/B/E/S analyst forcust for firm i's carnings per share for quarter t (in the last month quarter t earnings per share were forecasted)

^{*}Exercises announce events are passive a compensed by training bulls,

Defluing are two reasons to expect such a result. First, NYSF to collect frequently simply cases making runders, whereas NASIAO dealers would muticipate on both sides of such a trade. Second, at times, NASDAY dealers was straight a make shares among themselves in order to facilitate a made or the measure. Because cash NYSF stock is usugmed to one (and only one) specialist, another facilitating trades unlong specialists are much less likely to take place.

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Hins, analysi torocast errors in the study-no couply proportional deviations of activition of reactive specificate near the most reconsument Will's among a constant of entitions per share for the same from and quarter, We as some that the a analyst forecast errors prouv for the micxp. and companent of fire, the magnitude of the surprise in the earl of physics. intersect to the market 1. The consections Al For the NYSE radio : hours group (No.) 2018 6 3491 m. 2010) with a standard tevintion of 0.714. The name toncount ABE for the NYSE montading hours past (N = 800) (0, 1012 (0.12:4) with a standard devantion of 717 The mean arediant AHL for the NASDAQ anding-terms group the # 3 mg is 0.3594 (0.1429) with a standard dovintion of 0,7020. The moun (median) Alt. for the NASDAO nontraining hours grown (% = 8.1%) is file of 200,1933) with a anudard deviation of translate The mean (median) AFE for the MYSE trading-halt group (N - 2000 4802 (0.4443)) with a standard deviation of 0, 1336.

R. Transaction Time Analysis-Returns Vests

In this section, we measure the special of adjustment in transaction time by examining the magnitude of abitumnal shock for any from a transaction-by-transaction basis; a roung from a pricing strategy based on the sign of the VII. The strategy we use a display to the one used in Patch and Wollson; 1984); We are the stock of the Ail is province and sell it short it the APE is negative. We calculate event pound abnormal transaction returns by adjusting each observed ray, transaction return for a fire a quart 7, and nine of day-specific average transaction return. We adjust raw returns in this marmer to control for 1) the U-shaped pattern in initiaday returns first documented in Harris (1986) and 2) the possibility that firms that adease news during nontrading hours new systematically differ from these that release new eduring trading bours. With regard to the second

"It should be nested that the printy we change for the market's expertation of current compareds critically important in determining the amount of meanwarden enter in the comings should be ablented the constitute of studies that continue the maintain of time who and fixingly . But threeness of carning to the analysis forces: To on average more a street में क्षा है जिस की अन्य के कार कार्य कार्य कार्य के किया है जान के के किया है कि माने मार्थ के मार्थ मार्थ में monoments in dien (i.e., in a try) windows A . The in there a and Angewite 1987 and 196 if Brown and Rose 1974; and Fried Great, 1982). Because of this evidence, we are Militian arrange inversaria m this patroc.

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real west for themseteriates of finns that release to we at extrain takes affect their return generating process then adjusting how went-period return by find of the average remains per ides some council for the officer of these . in metalistic and facilitates comparisons 17

The average is acceptant retains are calculated for 15 minute interrule the finning at 2030 a.m. and energy at 4.00 part. The with the real code quarter during days. If the 26 (rolon) to the conduct annualis community which is a midestal day . Thus, for each firm in such squares, we carried to the as once thereas in actual this real dumps of monte uncovals throughout the tradery day during a quarter specific estimates of period. We adjust each firm's mix even peasit transacted returns by the average is meaching return calculated for that the general quarter and during the appropriate 15-minute into val.

Table 2 contains the results of the smaleys for all of the NYSE anding and numbering-hours a commence. Fable contains the results of the strategy for all of the 3 ASDAQ unding-ned more dong droup consumerations. Holding period abusin ad externs the recurrence for than author to transaction. begins are with the with transaction betwee the release and encia. This die de laty dith umsachen. The factories of Mean a seemal means are presented for each transaction, along with a statistic site or range sides a stage the outliby withesis ol zero abnorma returns. We also measure the mean consultance abnormal return (mean CAR) earned between consactions 10 and 15 and show the comulative perceisage of the total mean Cod connect their rach ichibarini).

to Lable 2 shows, for the NYSE trading-hours amount courts, stabilitally significant positive abnormal returns. Forms for six of the first seven post announcement

White the head is assumed the continuent for the continuent of the continuent of the state of the continuent of the cont ch form chemica numbrocaments him and meaning about the mark and of 113) NYSE to us; No. 20 and as 100 NASDAQ firms, and game a past manager. made of least \$000 of their currence amountmenters during trading hours (A - autor 10:04/5E from No. 15 out of 1000, 15DAQ for which was some deferences to permutate the realing hours amounted and to be meditor is in the green enterthing or continued to the continue of the manufacture of the continued of the c market alter of etg. it \$2.4 billion on \$1.5 lettless for the SYSE Lading to the state of the companies and state of the companies of the com Thing or the NASIASOLICATION of Manager Court malor bergards) to apide adjence upon come to be godien on the 20020020034 contradiction of the course of the course of the characters of 2017 Charge - 190, 37 Senior has not NYSE and ing disease and women stores and the stores represented and the state of 8 91, 188 criminana ravid grahamena has mentaminan GAMAZ - anam response to the distribution of the Little armone section during medical and concentrations on the Kanded is become when by between the pulment is expense of Limes recommendate relacion country 54.6 Ethical and 5.11 million for the eliab mount but douteon or common the mit Of the A.F. althous, 1823. solume or 242 755 cases and 25 and shares for the NYSP, and the N CAD to almost menouncers, respectively.

Table 2. Average Abnormal Transaction Returns Farned by a Trading Strategy of Buying Stocks with Positive Analyst Forecast Errors and Selling Short Those with Negative Analyst Forecast Errors: NYSE Announcements

Abusemed transaction returns are calculated by a basting observed returns by a true—pecific quarter specific, and time-of-day-specific arctinge return. NYSE announcements are those 1,702 quarterly enoungs announcements for hidding the 5 announcements that were accompanied by trading basis made by PONYSE trans during the 1991-1994 time period. Trading-known amount, or into the 500 are those attransactions made is recently flower, and 4.65 p.m. EST. Nounceding-liques amount enterests (N = 800) are thus model at the 1901-190 and 1900 p.m. and 5.70 p.m. EST. I standard are for the test of the full hypercosis of consultration.

-	Trading-Hours Announcements			- Non itadi r	ng Hours Annou	coments
Transaction Relative to the Release	Mean Abnormal Return	Cum. % of Total Abnormal Return (%)	I-Statialic	Mean Abnormal Return	Cum. % of Total Abnormal Return (%)	I-Statistic
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^{**}YSignificant at the 0,01 level.

^{**}Significant at the 11.05 level.

Significant at the 0, 10 ic rel.

irransicions, with the first post anomineracial massicities coustain 41 accounting for \$12 of in a dal CAR carn d in grantagies; -25 (the rule of abnormal report for francticus; +1 is 207%, which is sign-mont in the fifth level). Is Approximately 78% of the total CAR accrues by transaction 57, with alternated to the samed a largery regally over the the envertimention to contact, withinking enforced only direct of the tire. produce serving miner active server post impromisement trade come for the SAST the traditional transference in the first past anniversaries in transaction (the epochie) to assection after the announcement precounts for 69% of the Land CAR's arned by transaction +25 (the mean almormal return for this transaction is 0.71%, which committeens as the 0.01 (co. 1), and 33% of the retail CAR in only by transmitten and

The data in Table 2 on reale that regardless of when the announcement is made, approximately 80% of the total CAR s corned by the several post amount in the transform. There is, however, one projection difference in the price the every preserves. If the amounteement is made during training hours, the first passaure meetners transaction account for out. 14% of the field CAR, where if the must be smorth to trade during the artistic featers, the first medical material transaction the premient leader account for the of the left (AR " legac I contain graphs of CARs calculated from the abandmal returns presented in Table 3 and the states in the following in the price discovery processes. This difference engrests the rejection or the which posits no therenes in the price discovery present following amounts mean during rading and thenfracing fours on the NYS 11 Using a measure of dispersion developed in Glasser (1962), we formuly reject Mar at the 0.01 level. "

Table 1 contains the result of the truffing success for all Make a supplied that the submitted of the parties o As the talk shows of the felt ever post-announcement immisactions for the NASHAQ made in hours and subconcents, significant abnormal resolut are carned in only transaction a (flat) on a garge page of the accombination 72% of the and the particular consaction and Significant abnormal refugged out as our name and leap security +1 . -15, and +23 of the on average or the duce transactions, all at p -Of the Significant abnormal returns and cornect in four of the "At a ven transactions for the NASDA anominating hours automicinate However, during transaction +1, 1000 is cannal on average, accounting for approximately solve of the total CAR earned by Lansaction 15. Significant absorbat returns that accepte for transaction (-2, +3, table to foodly (1.07% such), with 98% of the real CAR accruing by frankáchióa

The data in Table Vindo are that on the NAMOAQ, the that post-amount cross trade impounds the majority of the in a restainse to the news, regardlass of when the and a content with made (72% and 58% a city tradical and acagading land complex, to declarely) burtherms of 13% and 18% is the first ("NR") is must by transaction if for the undireduces and neutrality hours announcements. respectively. Thus, the price discovery process is much ners wallar for trading-house and assurading-house authorns schents on the NASDAQ than it is on the 83 Sta For both types of autononcements on the NASDAQ, the of armation appears to be impounded a father price offer only a two transactions, with the prayenty being reflected in the first post-appropriate make Figure 2 contains exaphs of CARS reductated from the abnormal returns presented in Table 3 and illustrates the similarity in the price discovery processes These results do not sugge that How can be Response

The smallarity in price discovery processes for the NYSE and the NASD \Q nontrading hours amounteements, given that an overlight period of contrading precedes the past manufactured opening of trade on both exchanges, is onserved with the notion that the NYSE's formal cull market remains mechanism and the NASDAQ's informal pre-opening price discovery process are both effective in separating at informative opening price. ²⁴ However, it is

^{2.4} page 12 and 3 down page, and relatively stable by many, come +25, and no see, them had percomposed processations are to have no the total price and ment by it measures =22.

¹⁸N_C significant absorbed or trap over observed in termologists ≈2, ±3, ±6, and ±

[&]quot;Recall has a religious the NYSE, a assection of represents a batching assection of metal assection for the control of metals and the second of the control of the control

The mand in the simple from the service of the assummentation that the make their making hadre here that the service with trading hadre. The mail analysis steep probates in the honor, the calculated distormed the extending her assumentations of the 25 to well. We find an averaging the extending her assumentations of the extending here also define a country of the extending here also of enumerical models in the extending here also of enumerical models in the extending here also of enumerical models in the extending here also only the extending here also make the extending here are assumed to the extending here also make the extending here are assumed to the extending here and the extending here are assumed to the extending here. The extending here are also as the extending here are also as a considerable and the extending here.

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in fact, and the solution of the constant of 23 is constant, the constant of t

²⁹However secult that for our ampl, firms, the NASIAQ exempt 1. Jumes appears to imposed sleghtly core of the normaling-hears into auditor into prove The overtee of armoratal education and the 88% of the heal CAR core of the normality of the NASIAN policines of 1914 SYSE, a measurement of the NASIAN policines of 1914.

Table 3. Average Abnormal Transaction Returns Earned by a Trading Strategy of Buying Strake with Positive Analysi Forecast Errors and Selling Short Those with Negative Analysi Forecast Errors: NASDAQ A STREET STREET, STREE

Abnormal transaction tenuns are calculated by adjoct to observed returns to a firm specific, quarter-specific, and time of day specific to estaye teturn. NASDAQ antisomerments are the Life superferly earnings announcements made by Hill NASDAQ forms during the there and time period. Tealing hours accommended to the part of these accountable intermediate intermediate. The first and 4 M part EST. Neutral of body appearancements a \$55 are those management and broken \$3 on m, and 9.30 are EST and \$30 pair and 9.30 grave EST, a state of the analytic and the not happenhause of zero above a bindian contains the automates of pushing above and refunda-

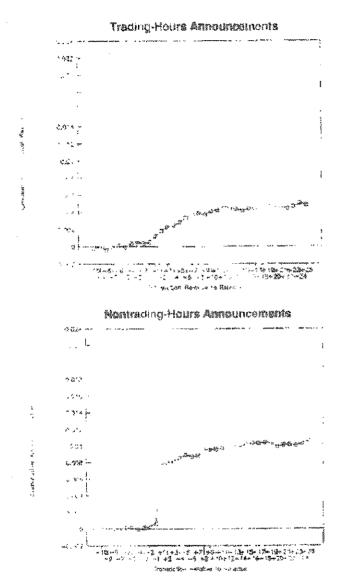
	Trading	-Hours Annound	ements	Nontrading-Hours Announcement			
Trensaction Relative to the Release	Mean Abnormal Rejum	Cum. % of Total Abnormal Return (%)	FS tatistic	Mess Abn ormal Retugn	Cum. % of Total Abnormal Return (%)	j-Şintisik	
-10	f(114).(t	1 18	0.11	6.01 06	3.75	0.12695	
မစ္	-0.0009	~9,1 ₁	1,1968	(大)其中1 <u>"</u>		0.536T	
4	(LDO) 7	10.59	2.4(11)**	(11KK)]	321	-0,2959	
	-0.001-1	*.8x	-1.6927	O. Wid3	1,50	0.7282	
ń	17.00112	.2_13	:: "574	0.08805	2.29	· 1*K34	
- n	-0.0005	*3.5%	0.0040	4),()(#)]	1,34	-0.1328	
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- 3	0.001.1	15, 39	1 (1894	().(×4)?	4,5%	1.563.	
un Ž	0.0011	2.35	1 1/1/1/1	CONT.	5 M	1.4696	
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₩6	11.18¥)2	83.53	034.73	0.0007	1(M).(X)	1.56484	
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	07 (8,8) %	77.Mi	0.1307	(),(HR)4	J13(X)	10043	
.9	(LEKRY)	88.24	1.1625	i (XXII)	100.46	0.7817	
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s 1 %	1111114	85/34	0.5732	7,000	101748	0.3147	
+11	0.0000	11K)(4)	L2938*	Oralia.	计序型数	1.7913	
+15	(1,18(4).)	14.12	1.5072	-0.046	102,29	-1.2130	
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+18	and and the same of the same o	1.76	1,11178	0.0001	100.92	0.2408	
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• 70	(A)(A)(A)	10x4	-31,53,65	10000	100746	0.3455	
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422	0.000	(10.59	0.7663	43 (30)05	105.34	-1,0794	
-6.3 f	17.18112	124.71	1.50%	0.000	105.63	0.65%	
r34	-0.0011	1.1.76	1.°c856K	-0.(W)[]	98.62	-27754	
. <u>2 } </u>	- ∌ (()))}fi	1000,00	1 10	A CHOLD	100/44)	0.8110	

^{***}Signifacing at the 0.01 level.

[·] Niggificant at the 0.05 level

[&]quot;Significant at the UTO level.

Figure 1. Canadative Alegorand Transaction Returns for Trading-Hours and Nontrading-Hours Enrologs Announcements on the NYSE

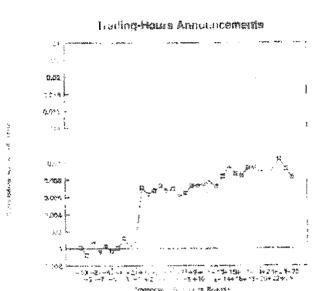


Abnormal transaction records are extended if by adjusting on the returns by a firm-specific, quarter-specific, and time as a lay-specific every a time. In St. amountement and these finding the continuous states of the supposed that were necompanies by hading nates made by 196 h 181 flores during the 1901 time period. Trading some annunconsents to 550) we these announcements made is been 9.30 cm, and 100 pm. EST. Normaling-hours announcements (N + 802) are those announcements made between Bast name and a strain. EST and 4:00 p.m. and a strain. EST.

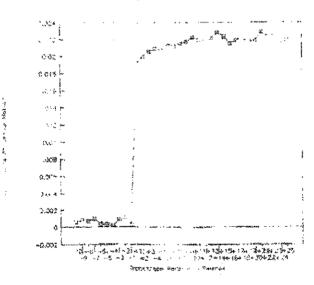
their guiterment to been quite executed and and addicagnostic results in sufficiently broad dissemination of the information to province an informative opening price and that it is effect dominates. The accould compare a mide variety of opening mechanisms, all of which are preceded by a nontradiag

"In order to Evolutarists the colors of a manuality period and the so large mechanism on pure discovery. A talkid and his polytom of the essanare the happing mechanism couplinged on the Tokyo Stock Exchange (15). This leave als guillest doca to grunniese add in guilhest unqui sa bei innelisare again after the two-liver lime is break. They that that price a contact stillate inflowing the meaning options and conclude that with the highest mechanism is amployed, the train of the roundaling period new effect once

Figure 2. Cumulative Abnormal Transaction Returns for Trading Hours and Nontrading-Hours Farnings Announcements on the NASOAO



Nontrading-Hours Acnouncements



Absorbed transaction returns to extended by adjusting observed towns by a firm-specific, quarter, profite, and time-of-day-specific average return. NASIFAQ amounteeness are the 1.187 quarterly earnings unununceness and to NASIFAQ firms during the 1990-1994 three period. Trading-hours amounteeness (N = 349) are those amounteeness made between 9:30 s.m. and 4:30 p.m. EST. Nontrading-hours amounteeness (N = 838) are those announced at made between 8:43 n.m. and 9:30 s.m. 1:87 and 4:00 p.m. and 6:30 p.m. EST.

dispected. It should be noted that the larguest archanism thirters from the NYSE cut market agreement and the NASOAQ aformat pre-opening my c discoverying one important to spect. Unlike the specialist and NASOAQ dealers, the value of CISH market motors the not make on these on a second.

they are simply man n-makes. Had the Lid's time nestiment of the first some is climated with NASI's or the NASIOAO's man constitute whence it has based amined and Mandelson's (1991) results to help disconnigle the effects decreased above.

period of the same length, and if they all performs a combilly equally we have constructed and intermetive aperiod order to be a because intermetive aperiod order to be appropriately.

Authorish prace discovery (allowing nontrading-to-obcommunication is the contract of the configuration of the contraction of the contract of the c the two exchange rice discovery following mading nours announce ments de learning to direct. On the 1978E, six of the first seven protesses a more trade for late. result in significantly positive and overal returns, where we is the N. 1970 and you has post a connection to the same in a significancy positive abnormal action, thus price discusery appear, to obquire more transactions on the NYSE. This evidence supposes direction of this. As a self in the processes section, energy reads and continually this that approaches on the NYSE are explicitly charged to the maintaining that and scherly" markets. That is, they is, required to the exchange to attempt to traints to a smooth sequence of gives while markets are open and a ord large price change, extreen successive translations, As noted in Cowan, Carter, Dail and Single 1992, A NiDAQ dealers do not explicitly have a similar requirement. Then, this to the mean column sort some one continuition to news appearance on ouric during tradition one on the

the important carefulation of a there is been a to discovery patients are sensitive to the level of stuppise to the carnings announcements, to order to a samine this issue, as-रामानेक्षास्त्रके हत्। ज्ञाने एकं व्यापका नेवाह अपीच्याना अपीक्षा ज्ञान स्वाहर । determined by the ingenimele of the All Earths announcements When only puricularly estimating (AFF are 30) automatements ne considered, similar gotterns are observed to the average t Alts, Figures 3 and 4 show graphs of the Colles accoming transaction by transaction from transaction +10 p. c. assistion +25 for the NYSE and the MASH NO AFE , 60 Main complete. respectively. As the figures show, the particular or his covery processes are similar to those observed for the sample as a whole although as expected, the natemitade of the past response to the more surprising numbers countermouts is larger. When the strategy is applied to appropriette with AFIs > 0.15 and AFEs > 0.50, the have price discovery to their retains, and in we conclude that they are not sensitive to the degree of sugarin the sample announcements.

Another important consideration as whether he basic price discovery patterns are so more to the "good or "bad" nature of the surprise in the announcements are black and Mohan (1924) for a discussion of the nature of news and a release time). In order to examine this issue, as split our NYSE same a more two subsampless one that commend all

carning amounteened with prefixe AFEs to "good" news subsumple) as time that case rectall corners must measure to the negative AFEs to "bad" he subsample. The base peace discovery patterns documented in Figure 1.4 consess and so we conclude that the difference in practitiscovery recursum nontrading to us and reading hours amounteened is not discovery.

C. Charl Time Analysis-Returns Tests

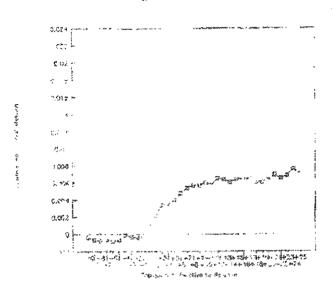
he this section, we present the results of this arms to hope strategy how you, this tune we measure returns in clock time. Tables dand is present the results of the trading strategy applies the NYEL and the NASDAQ samples, respectively. Holding period algorithm course in the robles are in a godover 15-minute intervals, with the exception of period 9 returns on the neutrading-hours appoint countries discussed below: Per reding-lower manuscravers, we examine is minute about and course beginning an hour and a half before the amornications and continuing until an hour and a that after the magnificement, whit period is entaining unand inceners, in order to soul making semigial and to manufauding the returns to contraduce to as somples. we be like ordy tops, to make that taking place during trained lemps of the appropriation of the Forton nontraling-nume camples, we define a red that the overnight period containing the automorphism for our simples. Period for monutable trains automorphisms is the first 15 minus leading period after the operang transaction. We also present a complu returns for an all and for the first two 15-campile reading periods after the opening of trading on day of for all samples. throughal 15-monte returns a conscionated as the difference there can observed 15-minute returns and a form-, quarto a and care of day-specific average rotum (considered over the cane the on estimation as described in the last credition. Abnormal eventuply religions are calculated as the difference between the observed evernight rentrus and an average com specific, quarter-specific overnight return (can alated over the same recent estimation period)

the date in Table 4 indicate that for the NYSE trading-hours amount wherein, 35% of the total CAR carned an boar and a limit of the total CAR carned an boar and a limit of the 15-minute period containing the release (mean abnormal return of 0.34%, p < 0.01, 27 In the next 15 minutes, an average abnormal action of 0.13% (p < 0.01 for realized. Throughout the next hour and 15 minutes, relatively small and statistically ineignificant

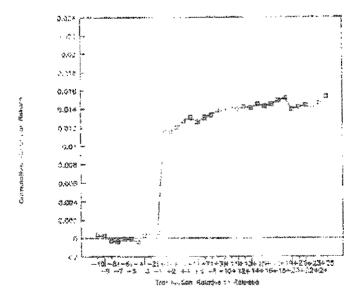
We thank an an aparagus review, that supposition that succeed during the Price I and the Span (1914) and an overage of rote of 0.2% that he first trail during period following critical relatives made by their comple funds.

Figure 3. Cumulative Abnormal Transaction Returns for Trading-Hours and Nontrading-Hours Particularly Surprising Earnings Announcements on the NYSE.

Trading-Hours Announcements



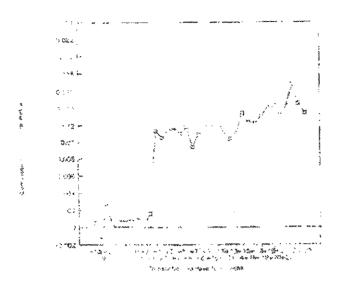
Nontrading-Hours Announcements



Abnormal transaction returns are calculated by adjusting observed returns by a firm specific, quarter-specific, and true sof slay-specific average naturn. Particularly supprising announcements are those with AFE > 0.20. Tracking-hours announcements (N = 18th) are those announcements made however 9:30 a.m. and 4:00 p.m. EST. Nontrading hours announcements (N = 320) are those made between 8:30 a.m. and 4:00 p.m. and 4:00 p.m. EST.

Figure 4. Countrative Absorbed Transaction Returns for Trading-Hours and Nontrading-Hours Particularly Surprising Larnings Automorphents on the NASDAQ

Trading-Hours Announcements



Nontrading-Hours Announcements

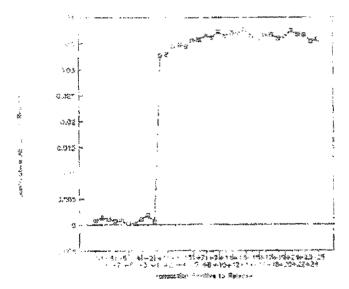


Table 4. Average 15-Minute and Overnight Abnormal Returns Farned by a Trading Strategy of Buying Stocks with Positive Analyst Forecast Firors and Selling Short Those with Negative Forecast Errors: NYSE Amountements

Hosting period abusin all returns are measured in 17 no me mentals with the exception of Period b for the metraling-hours automatements. For the trading hours automatements. Period of the 15 minute interval containing the release. For the nominaling-hours automatements, Period b is the overright period containing the period of the first 15-minute period after the release. After made returns are calculated by adjusting one, read-nature by them is the quanter species and time of day specific average return NYSE statements in the second period by making that it is the first 15-minute period after the release. After made returns a resonance of the second particle average return NYSE statements in a second period by making that it is a first 1900 and and 1900 are those measurements in a resonance of the 1900 and and 1900 and 1900 and 1900 are those second statements and 0,50 and 1911 and 1900 particle 1911 because as the feet of the half hypothesis of zero abnormal made is not against the all statements of period in the order and period in the period in

	Trading	-Hours Annount	ements	Montradic	ig-Hours Annou	ncements
Holding Period Relative to Announcement	Mesn Abnormal Return	Cum. % of Total Abnormal Return (%)	l-Statistic	Meen Abnormal Return	Cum. % of Total Abnormal Return (°a)	t-Statistic
	-0.0003	7.4	×1.1.×	· (HB)2	1.5	0.836
3	(2(第)2)	1.5	6.84	Quadit	5.5	2.2. (-)*
4	· i i i i i i i i i i i i i i i i i i i	4.4	Owi	-0.000 2	1.1	0.697
1	(11 美紅瀬田養	7.2	· 1.636	\$\$, \$\$ \.j(}.\$	1,4	70/68*
÷	E (MA)1:	- 6 .3	(315)	-+1. ()(3):1	1.3	1.429
•	0,880	3.9	₩ 3 ₹4	0,0009	12.	2.196+-
de la companya de la	0.(3),34	79.8	A. 3444	\$\$ \ \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	76.2	7.924*
wg> 🛊	0.0015	11:51	1,455**	(*, 6 ()	87.1	1.2114 - 2
42	(XX)(t, t)	117.0	0.1-3	0,000	94.9	2.350 (**
43	1 + 5 N R (\$	119.2	0.259	(Link)	95. 9	0.337
	建筑数 的。	11K.2	-41.10)		47.2	0.50.1
+ 5	43.4英英克	103.7	1,5,00	OND	96.0	-1),4%±
-6	0,188)2	1000	(1,7 : 1	1) (EU)4	1(16)7()	1.877**
ollowing Accompli	CURIC		$\Omega_{\rm QMD}$	S(NN)S		1 187
Ony +1						
~i~ }	O.O(H1:		\$15.13	O (EXX)		(10)
* \$	0.0003		0.917	0.0002		0.682

[&]quot;*Significant at the 0.01 level.

15-minute abnormal returns (less than 0.05%) are curred. For the NVSE nontrading-hours announcements, the data in Table 4 clearly undeate that most of the price adjustment occurs in the overnight period containing the release (period 0), with 0.71% carned on average, p < 0.01. During the half hour after the opening transaction, significant but relatively small abnormal returns are carned: 0.12% in the first 15

minutes and 0.09% in the next 15 minutes. After that, appulicant abnormal returns are not observed until period so, and no significant abnormal returns secree suring the overnight period following the release or during the first half

[&]quot;Significant at the 190 book.

^{*}Significant at the U. look of

This finding of slight price to in the pust-up-ring ported it consistent with the finding of slight price drift in the post-balt period in Hopewist and a lowerty (1978) and Lee, Ready, and Segum (1994)

Vable 5. Av. rage 15-Minute and Overnight Amormal Returns Farned by a Trading Strategy of Beying Stocks with Positive Analyst Forecast Errors and Selling Short Those with Vegative Forecast Errors; NASD (f) Parameter of a silv

Holding period returns are measured in 15 minute interval, a mobile exception or period 0 for the availabing bouts among ement. For the resting-hour managements. Period this to commute outstal containing its release, for the confident-hours numerical Period the eventight provide containing a course, and Period to first 15 mins a seriod after the achieve. Above and resures in colonians to advitor observed remone by a respectly quarter while, and time-stable specific time return \$7.50.50 and annex to the SASPAQ firms during the 1991 feet one percent. Tracking bone, annous and a No. Person there are connectioned, month of several for any and dark part is \$1. Note: any hunt. movements in a source of the s boundaries are for the costs the mild by the costs of costs and a costs and the alternative of positive absorbal columns

•	Trading	-Mours Annound	bernents	Nontradir	g-Hours Annou	ncements
Holding Feriod Relative to Announcement	Mean Abnormal Retu rn	Ctan. % of Total Abnormal Rejurn (%)	ı-Statistic	Mean Abnormal Return	Cum. % of Total Abnormal Return (%)	1-Similate
~^^	0 Outo	10.5	11778	· 0.01X0 ‡	~ 1.:	1,418
-3	0.0014	26.8	4154	LIXXII	4 . 4	05.350
	0.0007	17.9	4043	√41 <u>(</u> ₹1 <mark>172</mark>		-0.564
;	0.000	12.2	0.40%	() (× 11)6	0.2	\$ 3255
	O (NAIS	3134	1.057	03850	- 4	0.507
-}	11 (XXI)	15.5	0.382	(1,071);	3.2	0.318
.,	(3,103×1	41,5	\$.455 T	0.003	147.2	(0)81 . 74
s §	Billiogia	IN 13	0.869	(),(1(*))	[] {.t*	1,710
, 3	61790 B	135.0	4500	P[00],1	MA	^ ::
	Usu (i	1200	1,123	(《新報》)	1612.16	Carlo
44	Ministr	\$ *** . *	n416	-Olkari	101.7	-0 4e+3
\$	MARKE	1323	(1.357	- EF (M) 15 -	08.9	11.9452
f .		# (5 #	C 200	0,002	1000	(f, 14)?
Folkswing Ovenught	0,0021		73104	1) 铁煤洼		0,198
Day of						
4 }	-4 ,047)		-47.126	018010		1.441595
• •	~ <1 (MM)		11147	-{}_{(A,R),1}		

[&]quot;"Signition in the U.D. level.

comain graphs of the CARs culculated from the abnormal raturus presented in Tables 4 and 5. Rocali from the previous section that approximately 80% of the fotal CAR cannot

hour of tracing the following moviese." Figures 5 and to by transaction +25 is earned was at the cost seven post-unnouncement transactions. (In average, these seven reprocuous are completed within 21 minutes attail the armount coment for the trading-hours group and within the

through which the announcement is made spirited -1). We also observe in aftern abnormal return of 0.00% in < 0.000 in periods 3 and -3. then he no significant average absorbed returns he observed in the pre-timinate mant period for the NYSC madrig from minouriscences

^{2.48} ignations at the 0.05 level

Demision of the Oll level.

A. Table 4 shows these apparations some says decard pre-monute closers price adjustment has the NYSI, postrating hours amount contents in bargery) we cook unknown with the of a year (\$1 < 0.13) are council upring the last to remains of hading on the day presenting the everythin period

minutes of the opening trade for the nonacting hours group.
Thus, the classic time and transaction time results are consistent.

The abnormal return results thoth clock time and transaction time) suggest that in spite of the occurrence of abnormal transaction returns during several successive transactions after NYSE trading hours announcements, the majority of the price adjustment to carnings news occurs relatively quickly regardless of release time. Then is, even though the price adjust of release time. Then is, even though the price adjusts dramatically and quickly once post announcement trading begans. Note that because some period of no trading proceeds the first post-announcement trade for the nontrading-hours amouncements, in clock time relative in the announcement time, the price discovery process is more prodounced for the nontrading-hours announcements.

The results of the same trading strategy applied to the NASDAO aurouncements are presented in Table 5. The data in Table 5 indicate that for the NASDAQ trading-hours angouncements, the price adjustment is rapid with approximately 59% of the total CAR corned in the 15-minute period containing the release interior abnormal returned 0.31%. p < 0.01 t 22 South, a signal trant abnormal seams are consect during the following hour and 15 minutes. For the NASDAQ noutrading-hopes annuncements, the overnight mean abnormal return is clerificant (mean abnormal return of 1,92%, p < 0.01) and accounts for essentially 100% of the total average CAR cannot within an hour and a half after the opening of trading. Some slight, further price adjustment is observed diving the first 15 minutes of tracking, resulting in on average abnormal return of $0.175 \, {
m cp} < 0.05$ over that period, which is then given back within the next hour and tillion minutes. After that, no significant abnormal return are carned. Thus, once again, the price adjustment is very rapid once trading because, it

These results combined with the results in the previous section suggest that on the NASDAQ, the price adjustment to carnings news reswell. The majority of the price adjustment is impounded in the test post-autoonteement trade, reparalless of the release time. Recall from the previous section that approximately 80% of the total CAR earned by transaction +25 is carned within the first seven post-announcement

In summary, the transaction and clock time returns analyses surgest that different may discovery a provided with his how and pentending-hours auteunce matts on the NYSE. and that similar more discourses is associated with tradingand nontrading-hours must be seen the NASDAO. Thus, our results appear rejection of the because of time. For announcements made only during manualing bours, price descovery is similar for the two exchange. The largest price administrative transfer in the one overnight trade surrounding the smount ement, with some slight, additional adjustment after the opening. For an americans made only during inding hours, price discovery rance across the exchanges. On the NYSE, price adjustment is special relatively events over the first several post announcement transactions, on the NASDAQ. the majority of the price adjustment is reflected in first post-annouse count transaction. Thus our revolts support rejection of Hall but not set Har.

The a sails in this analy differ to an these in Francis, Pagach, and Stephan (1997), but are similar to these in Jennings (1994), hymings documents a totallar, large exercisis mice regions to a sample of takeover announcements made during room along hours. Francis. Pagach, and Stephan find no market reaction at the open to arimual carmings news supreposed during nounal methods have. They offer two explanations for the result. First, they suggest that characteristics of an active market are necessary to impound new automation into the stock price. Second, they suggest that traders may submit only partial orders at the open to avoid fully revealing their interpretation of the news. With regard to the first explanation, the evidence in this study indicates that the overnight price change surrounding a quarterly manings release duce, on average reliect the fact that information has been released. Thus, it is not clear that an active, combinious auction market is necessary for public information to be represented into the price. The trading of slight, additional price adjustment after the opening, however suggests than an active market may well be necessary for process an amountation. such as traders' diverse interpretations of the news, to be impounded into the price. This is consistent with the findings in French and Roll (1986) that trading reveals private information. Thus, our results suggest that both the public

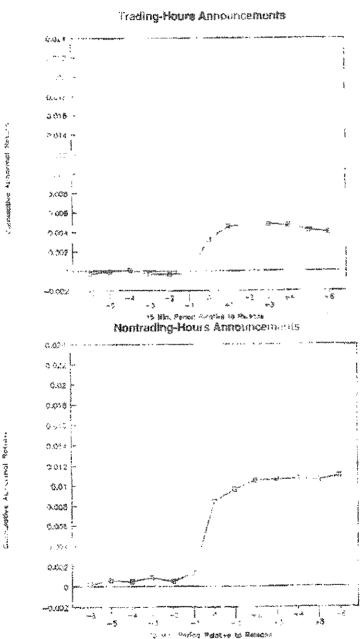
transactions. On a craye, these seven transactions are completed within 35 minutes after the authorizement for the tealing-hours group and within 10 minutes of the opening made for the naturaling-hours group. Thus, the clock time and magazing time results are consistent.

^{**}Recall that 1986 of the total CAR earned by transaction #11 or extend by transaction #11 or extend by transaction for The several transaction for severage, for annual about the analysis continue in clock time, 19.5% in the total CAR asmostly an actual color, inc. the analysis that half hour.

Mitourner, as put moted, since some period of no trading follows accurating hours amount enterty one could argue that in clock time is drive in the amount entert time), the pase adjustment is more prolonged by the normaling shows amount enterts.

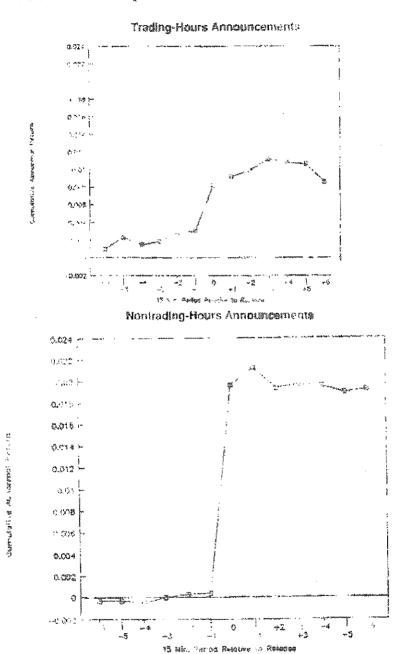
³²Francis, Pagach, and Stephan (1992) only examine the market response to annual earnings amount emerits, while we examine the market response to quarterly carnings announcements, which often contain more new

Figure 5. Commissive Abnormal 15-Minute and Overnight Returns for Tracing-Hours and Nontrading-Hours Earnings Announcements on the NYSE



Holding period almostical curies are measured in 15-minut cheerals with the exception of Period 6 for the nontrading-hours amountainers. For the trading-hours announcements, Period 6 for the 15-minute interest containing to release for the nontrading-hours announcements. Period 6 is the exempted period containing the 1-base, and Period 1 is the first for sinus period after the case. Abnormal returns an excludated by adjusting observed returns by a firm-specific, quarter-specific, and time of day specific average announcements are those 1.301 quarterly common announcements are those 1.301 quarterly common announcements excluding the 5 accouncements that were accompanied by trading balls of middle by 100 NYSL times during the 1990 1901 time period. Finding breats announcements (N = 5.1) are those announcements made between 9:10 a.m. and 4:00 p.m. ES1. Normatics bours announcements (N = 80.7) are those a nonnewment made between 9:10 a.m. EST and 4:00 p.m. and 4:30 p.m. ES1.

Figure 6. Cumulative Abnormal 15-Alimute and Overnight Returns for Trading-Hours and Nontrading-Hours Parwings Announcements on the N ISDAQ



Holding period returns are measured in 15 minute ancreas with the exception of Period # for the contrading hours are outcomented for the traduct-hours agreements. Period C is the 15 minute interval communing the adease, for the nonts diag-hours informed approximately Period D is the overnight period communing the release, and Period Das the first Dominute period after the release. Abnormal returns are enhanted by adjusting observed returns by a firm-specific, quarter specific, and time-of-day-specific overage return. NASDAQ armouncements are those 1.187 quarterly comings amount entents made by 100 NASDAO furns during the 1990-1994 time period. Trading-losers announcements (N = 514) are those amountaments made between 9:30 a.m. and 4:00 p.m. EST. Nontracting losers announcements (N = \$38) are those remouncements in the between \$46 a.m. and 9:30 a.m. BS1 and 4:00 jets, and 6:50 p.m. EST.

consumeration is the new schemest post continuous of private interpretations of the new schemest post continue content training contribute to the observed numericate prior mercements following in carriers:

D. Supplemental Analysis, Proceedintinuity and Volume Results

In this is non-we expose price containsy following the autoencements and trading visions in order to further one understanding of the trace discovery in processes. The processes the processes the processes the processes the processes the contains analysis is based on the well-to-amended "resoluted endersy" time negative social core amon) in intraday transaction proves. The rationale behind the analysis is that the minuted of information is likely to interrupt the normal price reversal tendency and or of in an electron the normal price continuations (i) and of in an electron charge of interpreted desired direction charge the adjustment percent discussions and level of continuations of typically interpreted to mail injection and of the price adjustment process. It

We present the relative displacement of price confimations observed for 10 true actions before and 2 manusactions of the carmines among a concar of both or making and montrolling-hours groups for des 5 VSE sample in Table 6 and for the NASDAQ morphs in Table 6 and for the NASDAQ morphs in Table 7. We calculate to sometime themselved to be a communities for each group of amouncements.

As Table 6 indicates, for the NASE trades were aumountements we observe operationately IS 6 continuous for the first six parameteristics above boards of F.119 to the observed proportions fall to an average of 13% over the next 10 transactions and then become statistically indistinguishable from its conclusions. These usuals provide additional support for the conclusions shown in the provious sections: Price discovery after tracing-board enrunges unusual errorms is extended or a several post-amnouncement

information than unused neverts. The may the explain the difference in our result-

transactions. The disco. Table 6 also show that, to NYSIs normalingst consumerations is a colsense 33% syntic common the operation trade sure along the concount ement approximately 6% continuations over the next section trades and then approximately 11% for the text sext section trades then church of 8 21% to These assumes a consistent which a large good at a total church the enemy a period of beautomates at 160 and be some and white of adjection in

As Table Cindica at for the NaSDAO and a though communications, we observe approximately 10% constraintings many first 15 post-immediates trades (ber linner of \$1.37 %). Some than the elegated propolitions during these trades and to be only unous in percentage points higher than the benchmen. Three while they are statistically significant fleey are not particularly high and develope and memoraless, with a rapid piec adjustment to the news the transaction from a for the NASDAO nontrading hour summentances out, we observe 35% commission for the overnous trade of the intermediation and signational elevated proportions of continuations for the non three transactions (20%), 12%, and 11% for each of those transactions, respectively, and elementaria of RAPPLAS in. e a cessile are consistent with a long price adjustment during complitive and for the american count followed by work anistral dimension.

Publics 8 and 91 more and reading a finne in share, a measured over 13 minute and evering hithe iding carrieds, for the NYSE and the NASDAO samples to protively, 36 Announal volume is calculated by adminiprolated volume over the rolling period by a fram process, quarter-specific, and time of-day specific according volume. (Consistent with previous research (e.g., 1 miber, 1987; Francis, Portich, and Stephan, 1992, and Morse, 1981), we find that trading volume processes after corongs announcements and stays elevated into day 41.

For the nontrolling-hours announcements, period it in Tables R and 9 to the overnight period containing the amount content. Thus, abnormal trading volume for period is abnormal volume observed during the opening transaction to Table. R and 9 show, we observe tentificant positive opening abnormal volume on the Ni. 8 but not on the NASD VQ.3 The is not complying start the opening transaction on the NYSE by a bardust magnetion que.

[&]quot;by details -- Parell and Scotton (1954)

The hyperpass have home kneed as a colombated as fell on a late time of a mineral source was determined from the change to a database. For each amount more, we then a result of more of the minimum subsected during an estimation period they. It for -2 is to the minimum subsected during an estimation period they after the amount more to the minimum content of the control of the co

These combines countly converted walls and such Stark Usher Berg found that their high new constant content in a convent mention of another content mention and their content mention and their are between the rights and sixteenth past an entermost transaction.

^{- 1965} S.M. 1972. Applies of authorities of Libert Line (Contains applied to the use

The prosespecific, preserves and land tempers in specific look comments as with all the distribution of the continue as a first continue as a firs

We decrease opinitions paster almost commo religios in the NYCE for not on the NASDAR, no day of the policy

Table 6. Relative Frequency of Continuations in Consecutive Price Changes Surrounding Earnings Disclosures: NVSK Annuancements

NYSF annumeration these 1.05 quarterly earthers inconcentratives, heling the 2 annumerates that were accompanied by making balls) under by 100 NYSE firms during the 1990-1994 ing. Trading-hours amounteements (N = 400 are those made between 9.30 scm, and 1900 perc EST. Nontrading-hours announcements: 1802 years these made occurren 4.00 p.m. and 0.30 p.m. EST. and those made between 5.10 and 50.30 a.m. EST, Unexpan spheres or consented for two contingency table one tailed tests at equality by tween the relative frequencies as conformations them; the event poor doubt the benefit and excited them: bornaric percent continuumous = \$ 1 % and \$2.79 for the trading-home and continuing forms amount contain respectively.

	frading-Hours A	nome carents	Nontrading-Hours Announcements		
rensection Number Reletive to the Release	Percent Continuations (%)	Chi-Squared	Percent Continuațions (%)	<u>Chi-Squared</u>	
(f)	3 1 3	2.528****	7.5	-0.752	
)	1.1 %	《美华新州》	8,4	0.144	
	* * * *	(11) [(1)	7. !	-0.876	
7	11.4	", i yti i FF	7.)	-0.876	
1:	9.8	£250 X	79,75	0.618	
-5	4.9	1 1172	7.9	41.361	
4	1 '41	l,nan*	*1,1	0.917	
` \	* :	Q.97	8.7	0.534	
	11.2	1335	4,4	£,€90° -	
. 600)	44	1.055	K.6	0.402	
**	1 1	8,4; § **-	323	25,401***	
; ;}	1 3 fr	0.44	5.5		
:	148	11,44,818	6,9	1.392	
	110	3884 x 3	16.1	1.32%	
• •	17.8	10 2 Jacks	9.7	1.566*	
+4	18.0	B	10.6	2.403***	
:7	\$ \frac{1}{2} \fra	4,9 %()	13.1	111147	
+&	13.5	400	4.2	057	
4.63	11.2	1 48(1*)	3 1	5. 1()1 ****	
+1()	14,4	5,1444	\$.0	0.794	
4.[1	***	3,325.44	12.8	1.770***	
4 h	13.7	4.16.38	144	1.948**	
11.	13.0	* ngfle* -	107	2.071***	
e-14	(4,0)	F # 1 11 PAGE	11.5	1.340-11	
÷ 15	1114)	1.	12.7	1.616***	
×16	95.8	A Comment	99	1.690**	
.17	8.5	11.565	· A	1.432*	
: 1%	11,2	\$19X61.	11.2	: 101=#4	
	9.6	\$ 3 3 4 %	#() //	5×6***	
+20	8.7	48.81 ···	9.5	1.309*	
* 21	0.3	0.893	9.5	1,309+	
+22	2.50	4.49(5.	9,2	1.051	
, 13 }	[11.2	1.711114	Ð,1	0.917	
+24	12.2	7 (1984)	8.4	11.19(1)	
* ***	F. J. Commencer	Anti-	().3	13351	

Minimum a fundat level

[&]quot;"Significant of the 0.05 level

Significant at the 0.10 to set.

Lable 7, Relative Frequency of Continuations in Consecutive Price Changes Surrounding Enraings Dischesures: NASIMO Animuncements

SASUALL and spiritub survit DALLOAR Out, it is not considered streaming that I soft one sponsorme and DALLOAR period. trading Ladar among a compact N = 349) and the mode between the are and edition in EST. Neutraling from announcements 13. Sistante those made between 40% p.in. and 6:30 p.in. 65 Constitutes made between 8:30 n.m. and 9; bun.m. EST. Chesquare stansium are presented for two contingency table was of quality between the relative frequencies of continuations during the overal period and the benefitiarit period distributed period contact on a 9.32% and 9.3% by the tending hours and hoursalmy hours Mental Horas probable

	Trading Hours Ar	uuonuceiusiga	Montrading-Hours	Announceine i
cisaction Humber Relative to the Relative	Percent Continuations (%)	Chi-Rqu ared	Percent Continuations (%)	Chi-Sque
١٢	10.v	$\{y_i\}_{i=1}^{n-1}$ is	7.1	'4%
g.	11.6	1,560%	8.2	-0.710
8	; <u>{</u> }	44,642	* 7	0.142
, ,	N. 1	-(1,7%)	* * * * * * * * * * * * * * * * * * *	2.798**
~ŕ	1.7.4	\$ 3 week :	7.6	[34]8
:	6.0	1.753	1) ()	41.11
·	1.3.2	1477#61	0.01	1.14.
	10.1	6. 45	9.2	0.784
	43 4		1594	ং কেন্দ্ৰৰ
***	13.5	Transfer to	le sja t	(4984
	14 <u>,</u> 3	*	<u> </u>	10 4744
	2.6	730	A Section of the sect	10 779 (*)
4. ·	;1 *	: 187	12.3	表和街***
r r⊸i			\$ e s ~ T\$	1835
	3	11.1.0	37	0.750
÷\$	160	1. 1. 2.	7.0	~1.0e-\
4.7	1,15	1.629****	4) 5	0.20
-}- %	116	111**	9.3	OUR)
y % i	115	- ` ` *	10.13	1.1195
+10	12.3	1,000	8.2	-0.710
[1	10.9	13414	K.:}	11_585
٠ ب	12.6	2.111	1 5 1 1	1.227
4-1	14.3	3.215	57 §	0.14
4 14	; ,} ₹•	2 1 1 × .	8.6	0.345
1 (5	10.0	0.450	h. ()	(1481)
: 16	7.5	n,0 90	10.4	1A74F
: E *	10.3	0.642	97	0.750
÷18	11.2	1387	7.8	1.187
-14	155	3.946	9.0	0/1/1)
+20	9	-9.383	₹. 1	0.832
÷24	11.3	1.13/	% 7	-0.223
	9 .7	0.269	100	0.983
	ેશ્રે બ	RXI.	** /\frac{1}{2}	. 1,7"- "
~ 2 4	•1.7	0.369	**. *	4.00
100 mg/s	11.8	1,500*	14 1.1	1.227

^{***}Significant of the 11/11 level.

[&]quot;"Significant at the 0.05 level.

^{*}Significant at the 0.10 level.

Table & Average 15-Minute and Overnight Mean Abnormal Volume in Sharest NVSE Aunouncements

Absorbed to church's measured over 15 minute intervals wall, the copping of Period 6 per communicatives amount entervals wall the resonance in the community amount controls. Period of the resonance control of the 15-minute intervals of the resonance in the resonance of the reso

	Trading	-Hows Announc	comenis	Nontradin	g-Hours An <mark>nau</mark>	ncements
Period Relative to Announcement	Mean Abnormal Vojume	Standard Deviation	t-Statistic	Mean Abnormat Volume	Standard Qevisitor	t-Statistic
63	F 1965	17,746	\$ 1638 *	1,453	21,15	1 4550
~.~	1,243	17,279	Lippy »	1,310	18470	2.64
.1	1.2%	12.386	1,582**	2.313	39,4:1	2.1 300
**_\$	(光)(-	18.190	1.181	2452	24,5104	114][[
	(403)	21.018	.265***	1.51	26 % 1	1 340*
1	yor	13,498	10.40	2,71)	\$4) ₁ + 11	2.060
()	101 193	11.921	4 1 . 1 . 2 . 2 . 4	10,984	-336	6.80-6
+ ‡	19 1 19	44, 44.)	9,309 12	<.856	21.310	6.6h4
+2	1:37	45,194	5.54871	14.126	40,51	8.045**
+3	5.503	30,646	AC 11385 -	12,401	1:480	6.788* C
+4	*, *\$.i.;	25,514	(1.11 St.)	\$ 1 (4) **	(4) (4) (4)	8.56.1**
1,5	6,070	29 711	1. 20% + .	11,36%	44.73	?. [영화비조
÷ሱ	रिश्तान	3250	R CAP 8	430.8×	1.322	grafija 🦥
Following Thomas	\$,130	33,658	\$\$\$ 50 ×	4 7:3 3	·	₂ 6 1 × 6
Day of						
÷1	3.1016	29,348	3.863* .	n.086	573	6.68-1 KF*
. 3	5.776	30,366	4.268***	: 1 00	32.406	6.528

^{* **} Significant of the (1.6) level

many orders are aggregated and executed during this one transaction) whereas on NASDAQ, it is simply a single trade these one trade executed by one dealers.³⁹

III. Concluding Remarks

For both the NYSE and the NASEAQ, there are a number of reasons to believe that different price discovery

The also calculated area, so almost an order size per immanum to take mars, notes 10 to 125 for each group of announcement. For the NYM spading home commoncements, we observe significantly practice average showered under size for the first four post announcement make; or oil is for transactions +6, 47, 48, and 49, for manuaction +1, 1,200 extra share; one traded on average, and for the real of the significant transactions. See additional altern were traded on average, For the NYM montaching-is used difficult shares were traded on average, For the NYM montaching-is used.

follows trading- and nontracting-hours announcements. First, for nontrading-hours amount machis, there is a period of no trading, which permits broad dissemination of that information. Second, for both the NYM, and the SASDAQ, certain aspects of the opening procedure differ from the

automorphism, we observe again and recar, abnormal or let size for temporations (2.1) and we rule with 1.50 solutional some match operating transactions (2.1) and the related operating transactions (2.1) for the NASOAD insiding anomalism matches are calculated and interpretable of the size of

[&]quot;Significant at the UUS level.

[&]quot;Significant at the U. I (Hevel.

Table 9. Average 15-Minute and Overnight Mean Almormal Volume in Shares: A VSDAQ Ammunecounts

shormal volume is measured over 15 minute income a particle exception of Feedeland contrading hours, and an enternal Englishing about a more contrading the investigation of the

PRAMA LUI LUI L	Trading	riours Ameam	cemenis	Nontracib	 19-Hours Annou	ncements
Period Relative	Mean Abnormal Volume	Spindard Deviation	i-Statistic	Mean Absermal Volume	Standard Deviation	t-Statiatic
<u>-</u> -	1030	10,017	×45 (15:	6.1	30,592	5.648**
^ ():	্হশাস্থ	18.158	3.185***	5.76	过,626	
	<u> Agricon</u>	36 134	₹ 162m24	8.16%	10,1390	117****
٠٠٠ ^ک و	8.1 M	2,540	1 37 H 14 48 X	13.50%	257	170 11 3 100
-2	4,88,4	982	151.42	12,505	0.87	8 , 5
, 1	7,819	210	\$ (\$4) \$* *	0.780	60,052	9.7.1
;	13 (444)	34) or	*	**	3.536	ं त रा
-1	[5],5 A1	}4 ,; [+1	5.692***	1 · · · · · · · · · · · · · · · · · · ·	3,4,619	まっ、6月9人中ルカ
*	<u>ا ۽ په يو</u>	37,691	· (19)27年末	ii i	J. 3.80°	1 - [4.2**)
+3	9.456	:×.1415	* 3 * 4 *	76.6 K	18-0.26-3	1 2 88 3 4 4 4
*-\$	9,414	<२०,⊬४	12 - 12 - 1	and the control of th	[3], (m)S	12.801 *
· ·	4/17	15.613	4. 14. 30.	25% F83 3	108,160	12.92500
	् इ.स.स्क्रूर	15,446	5.330	3 7 877.65	: 29,54"	11/16/44
gniwolloving Hymight	21	1833		, , , , , , , , , , , , , , , , , , ,	(235	× 1,742
Day +1						-
* }	11,822	56,203	1.8884**	1 1/25	79 .3 %	-3.50 T + P
· · · · · · · · · · · · · · · · · · ·	7.836	35.313	1,145***	· · · · · ·	71,04	3'083m.

[&]quot;Significant at the 0.01 level.

procedure in place during the trading day. On the NASDAO, the coll market opens trade and a continuous auction of a place during the rest of the trading day. On the NASDAO, the same quote-driven, dealer market is in place for all nades, however, the opening trade is preceded by an informal pre-opening price discovery process. Finally, the nature of competition among market participants is different on the NASDAO.

We analyze price discovery following controlly earnings announcements made by 100 NYSE firms and 100 NASD 30 firms during the 1990-1991 time period. Our results indicate

that in transaction time, piecedas very differs for contradingand trading by a communication on the NYS is but not on the NASOAQ, for circular, on bodies, hanges, the majority of the price response to nontrading-hours carnings amounteements is reduced during the opening trade. However, on the NYSI, the price adjustment to trading hours earnings amounteement is spread evenly over the first several post-amount ement makes. On the NASDAQ, the price adjustment to trading-hours carnings a mounteements is concentrated in the first post-amounteement made with only slight adjustment in the next several transactions. Although

Spois as a de 05 tret.

^{*}Significant at the 0.10 level.

transaction time analysis indicates some differences in price discovery, when clock time is consulered, price adjusts tipactly for both types of announcements on both exchanges. Thus, any differences or price discovery are reflected in the transactions immediately following the release. Consistent with prior research, we find that post-announcement trading volume is almortaally high and stays elevated into the next trading day reconsiless or announcement time or exchange.

The results in this Apple suggest that markets with different microstructures may have different price discovery processes one news releases, Currently, established stock exchanges are ordereoing rapid technological change, and new stock exchanges are been formed in emerging most to. The results presented in this paper provide some insight into the way certain types of markets impound information into price. I make research could examine the ability of other types of microstructures to impound information into price (e.g., Hong Kong sees quiterred order marking system: Takyo's match making sail market system; and Millan's three-phase opening system followed in continuous trading).

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